Listing of Claims

The below listing of claims will replace all prior versions of claims in the application.

1. (Currently Amended) A method of estimating timing of at least one of the beginning and the end of a transmitted signal segment in the presence of time delay in ~~the signal~~ a signal transmission channel in an OFDM system, the method comprising:

providing a set of pseudo-random signal m-sequences PN(t;k) (k = 1, ... , K; K ≥1) for which a convolution signal formed from any two sequences satisfies PN(t;i)*PN(t + Δt;j) = ~~δ(Δt) δ(i,j)~~ δ(Δt)•δ(i,j), where i and j are index numbers identifying the two sequences, t is a time variable, δ(Δτ) is a delta function and δ(i,j) = 0 unless i = j;

appending a selected sequence PN(t;k) from the set of pseudo-random signal m-sequences PN(t;k) to at least one signal frame to be transmitted to form a padded signal frame;

transmitting at least one padded signal frame as the transmitted signal through ~~a transmission~~ the signal transmission channel in which the transmitted signal may be received with an uncontrollable time delay Δt(delay);

receiving a received ~~version~~ signal Rc(t) of the transmitted signal associated with the at least one padded signal frame being transmitted and forming a ~~convolution~~ composite signal, denoted as Rc(t; Δt;comp), given as:[[,]]

$$Rc(t;\Delta t;comp) = \sum_{k=k1}^{k2} PN(t+\Delta t;k) * Rc(t),$$

where Δt is a selected time increment and k1 and k2 satisfy 1≤ k1≤ k2≤K;

forming a remainder signal, denoted as Rc(t;rem), where Rc(t;rem) = Rc(t) - Rc(t;Δt;comp); and

determining at least one time at which ~~at least one of the sequences~~ said selected sequence PN(t;k) (k = k1, k1+1, ... , k2) associated with said at least one padded signal frame begins in the received signal Rc(t).

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2. (Currently Amended) The method of claim 1, further comprising determining a carrier frequency associated with ~~said at least one of said sequences~~ said selected sequence PN(t;k) of the at least one padded signal frame being transmitted.

3. (Currently Amended) The method of claim 1, further comprising using at least one of ~~said PN sequences~~ the selected sequences PN(t;k) associated with the padded signal frames being transmitted to estimate at least one parameter associated with said signal transmission channel.

4. (Currently Amended) The method of claim 1, further comprising replacing at least one guard interval associated with at least one of said signal frames to be transmitted with ~~one of said PN sequences~~ a selected one of the m-sequences PN(t;k).

5. (Currently Amended) The method of claim 1, further comprising using at least one of the selected sequences PN(t;k)~~PN sequence~~, associated with one of said padded signal frames being transmitted, to provide time synchronization for said associated padded signal frame.

6. (Currently Amended) A system estimating timing of at least one of the beginning and the end of a received signal in the presence of time delay in ~~the signal~~ a signal transmission channel in an OFDM system, the system comprising a computer that is programmed:

to provide a set of pseudo-random signal m-sequences PN(t;k) (k = 1, ... , K; K≥1) for which a convolution signal formed from any two sequences satisfies PN(t;i)*PN(t + Δt;j) = ~~δ(Δt)*δ(i,j)~~ δ(Δt)•δ(i,j), where i and j are index numbers identifying the two sequences, t is a time variable, δ(Δτ) is a delta function and δ(i,j) = 0 unless i = j;

to receive at least one padded signal frame Rc(t) transmitted through a ~~transmission~~ the signal transmission channel in which the ~~transmitted~~ signal being transmitted may be received with an uncontrollable time delay Δt(delay), where a ~~padded~~ each padded signal frame comprises a signal frame appended to a selected sequence PN(t;k) from the set of pseudo-random signal m-sequences PN(t;k);

to form a ~~convolution~~ composite signal denoted as Rc(t; Δt;comp) and given as:[[,]]

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$$Rc(t;\Delta t;comp) = \sum_{k=k1}^{k2} PN(t+\Delta t;k) * Rc(t),$$

where Δt is a selected time increment and k1 and k2 satisfy $1 \le k1 \le k2 \le K$;

to form a remainder signal denoted as Rc(t;rcm) where Rc(t;rem) = Rc(t) - Rc(t;Δt;comp); and

to determine at least one time at which ~~at least one of the sequences~~ said selected sequence PN(t;k) (k = k1, k1+1, ... , k2) associated with said at least one received padded signal frame begins in the received signal Rc(t).

7. (Currently Amended) The system of claim 6, wherein said computer is further programmed to determine a carrier frequency associated with ~~said at least one of said sequences~~ said selected sequence PN(t;k) of the at least one received padded signal frame being transmitted.

8. (Currently Amended) The system of claim 6, wherein said computer is further programmed to use at least one of ~~said PN sequences~~ the sequences PN(t;k) associated with the at least one received padded signal frame to estimate at least one parameter associated with said signal transmission channel.

9. (Currently Amended) The system of claim 6, wherein said computer is further programmed to replace at least one guard interval associated with at least one of said signal frames with ~~one of said PN sequences~~ a selected one of the m-sequences PN(t;k).

10. (Currently Amended) The system of claim 6, wherein said computer is further programmed to use at least one ~~PN sequence~~ of the selected sequences PN(t;k), associated with one of said received padded signal frames, to provide time synchronization for said associated padded signal frame.

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